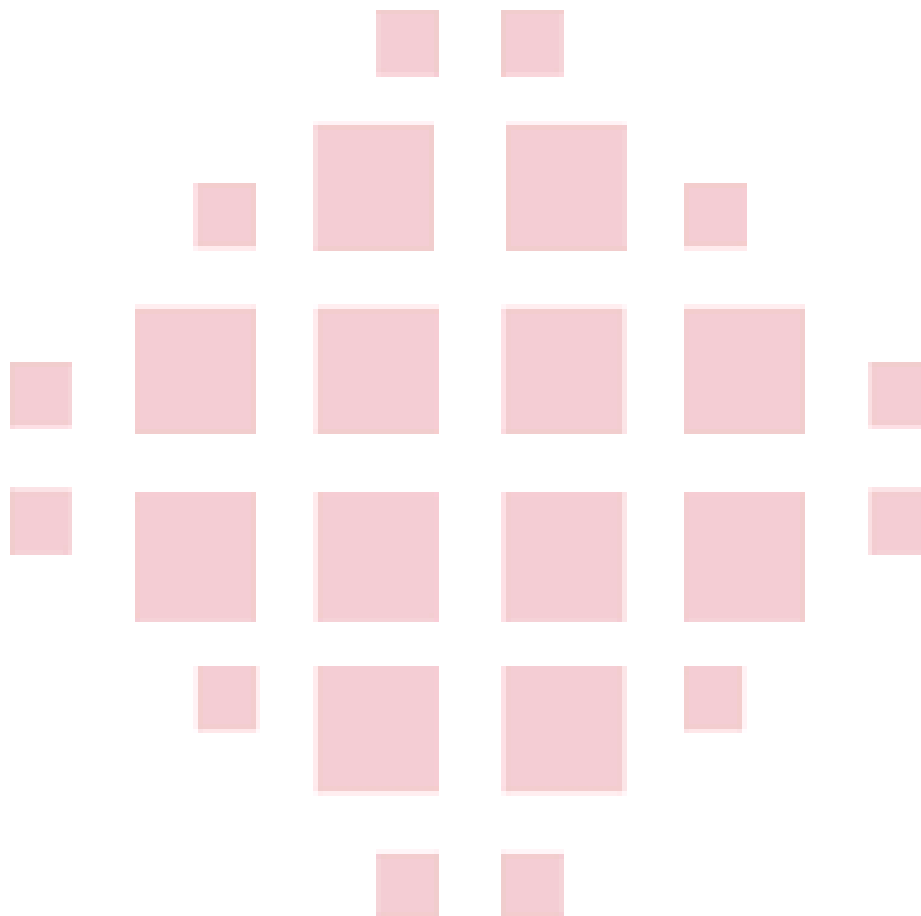




PARTNERSHIP TO FIGHT CHRONIC DISEASE

*Health Care Spending, Prevalence, Treatment, Health-Related
Quality of Life and Productivity Associated with Gout Patients*



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Gout is the most common form of inflammatory arthritis caused by the buildup of uric acid crystals in the joints. Few recent studies have examined spending, treatment and the impact that gout has on productivity and quality of life. Older studies have estimated that the prevalence of gout is approximately four percent costing \$6 billion per year.

<http://gouteducation.org/patient/what-is-gout/cost/>

Gout is an expensive disease to treat. Total per capita (all-cause) spending among gout patients exceeds \$11,000 per patient per year in the United States.

Treatment of gout has both short and long-term approaches and goals. The first is immediate pain relief from gout flares, often provided by a nonsteroidal anti-inflammatory drug(NSAID). While this provides temporary relief, it does not prevent the on-going progression of the disease. This requires medications designed to reduce uric acid levels below 6/dl. Without the right treatment, high levels of uric acid can build up and form crystals in joints and throughout the body. As the crystals accumulate, they can form clumps called tophi that may damage bone. At this point, patients can find it difficult to move without experiencing pain.

Most studies examining the impact of gout on health care spending and productivity are dated and are often limited to specific populations. This study will provide the most comprehensive national estimate among the civilian non-institutionalized population of health care spending and prevalence, quality of life and the impact on productivity and family income among gout patients. Specifically estimates will be provided of:

- The prevalence of gout, stratified by key demographics (age, gender, race, income, health insurance status)
- Measures of the most prevalent comorbidities among gout patients.
- Total national spending on gout and total spending among gout patients for all conditions treated.
- A statistical analysis examining the impact of multiple gout attacks on spending, use of medications to reduce uric acid, comorbidities (such as diabetes, heart and kidney disease)

- A statistical analysis examining the impact of UA reducing therapies on non-medication (hospital, physician) gout spending.
- Trends in health-related quality of life (activities of daily living, function and mental health well-being based on SF-12) over time.
- The impact of gout on average hours worked and household income. This analysis will examine days of work lost due to disability, hours worked per week, personal income (for the gout patient) and family income.

Data and Methods

The Medical Expenditure Panel Survey (MEPS) will be used for the analysis. A detailed description of the MEPS can be found at their web site, https://meps.ahrq.gov/mepsweb/survey_comp/household.jsp.

The MEPS tracks individual and household demographic, socioeconomic, and health-related characteristics, providing a nationally representative sample of the U.S. civilian non-institutionalized population (the study population of inference). The Household Component of the Medical Expenditure Panel Survey (MEPS-HC) is a nationally representative survey of the U.S. civilian noninstitutionalized population. The sampling frame is drawn from respondents to the National Health Interview Survey, which is conducted by the National Center for Health Statistics. The MEPS-HC collects data from a nationally representative sample of households through an overlapping panel design. A new panel of sample households is selected each year, and data for each panel are collected for two calendar years. The two years of data for each panel are collected in five rounds of interviews that take place over a two and a half year period. This provides continuous and current estimates of health care expenditures at both the person and household level for two panels for each calendar year. To provide estimates that are representative of a national U.S. population, the MEPS-HC panels have oversampled subgroups of individuals such as Hispanics, African-Americans, Asians, low-income households, and those likely to incur high medical expenditures. At the time of the analysis, the most recent available file was for 2015. The 2000–2015 MEPS full-year consolidated, medical, and pharmacy utilization data files will be combined to generate an analytical cohort with robust sample size.

The focus will be on non-institutionalized patients with gout (ICD-9 code 274) from 2000 to 2015. Variations in costs and productivity associated with different medications and treatments among patients with gout will also be examined. Of interest is the examination of differences in treatment costs and outcome measures such as hours worked and personal income among patients treated with drugs for pain and inflammation, drugs for lowering uric acid and patients taking both medications. The cohorts will be compared using multivariate regression on direct costs, indirect costs (measured in terms of employment status, annual wages, hours worked per week and workdays missed), and health-related quality of life (HRQoL; measured using Short Form 12). This baseline will allow a comparison of the potential health care cost savings and improvements in productivity and quality of life associated with new treatment innovations coming to market.

The estimates rely on regression analyses where the dependent variable is total health care spending during the year. For controls, an indicator for whether the individual was diagnosed with gout, and a count of the number of comorbid conditions is included. The type of health insurance, demographics such as age, gender, race, education and income are also controlled for and an indication if the gout patient is taking an anti-inflammatory medication or a medication to reduce uric acid production is included.

Descriptive Results

Data from the MEPS provide estimates of the number of gout patients that have been diagnosed and treated. This differs from other national data sets such as the National Health and Nutrition Examination Survey (NHANES) that reports prevalence based on clinical measures and self-reports. Previous estimates from the NHANES tabulate the number of adults with gout and hyperuricemia (patients with a serum urate level of >7.0 mg/dl for men and >5.7 mg/dl for women). These data from NHANES include patients that are treated and others that have not been diagnosed and remain untreated. As a result, estimates of the prevalence of gout from the NHANES are higher (nearly 4 percent) than reported among patients diagnosed and receiving medical treatment from the MEPS.

The national treated prevalence of adults with gout from the MEPS in 2015 was 1.5 percent—some 3.6 million adults (Exhibit 1). The prevalence of gout has nearly doubled from 2000 rising from 0.8 percent to 1.5 percent (Exhibit 1). The NHANES reports similar rising trends in prevalence.

The prevalence of gout varies across key demographic measures. Adults 65 and older are three times more likely to have gout than those under age 55. Males are three times more likely to have gout than females. Health status also matters as those in fair or poor health are nearly six times more likely to have gout than those in excellent condition.

Virtually all gout patients have at least one additional chronic condition (Exhibits 2 and 4). Over five percent have one, eight percent have two, nearly 11 percent have three, 11 percent have four and nearly 65 percent have five or more conditions that are chronic. Among those with comorbid chronic conditions, 77 percent were hypertensive, and 60 percent had hyperlipidemia in 2015. Another 37 percent had heart disease and 34 percent had diabetes.

Among gout patients, the prevalence of each of these comorbid conditions is increasing over time. Gout patients with hypertension increased from 44 percent in 2000 to 77 percent by 2015. Similarly, the prevalence of hyperlipidemia increased three-fold from 20 to 60 percent. Gout patients with diabetes nearly doubled, rising from 18 to 34 percent while gout patients with heart disease increased by 5 percentage points to 37 percent.

The prevalence of these comorbidities among gout patients is significantly higher than observed in the general adult population. For example, 69 percent of gout patients are hypertensive compared to 22 percent among adults overall. Similarly, 47 percent of gout patients have hyperlipidemia compared to 16 percent among all adults. Nearly 30 percent of gout patients are also diabetic compared to nine percent among all adults.

Adjusting for inflation, spending to treat gout has increased from \$680 million in 2000 to nearly \$1.8 billion by 2015, or nearly \$500 per person (Exhibit 3). Total all cause spending (all health care spending among gout patients) totaled \$11 billion in 2000 about \$7,374 per patient treated rising to \$53 billion, or \$11,480 per patient treated in 2015.

Medications used by gout patients were also examined. Over 13 percent of gout patients did not use a medication during their gout-related episode of care. Nearly a quarter of gout patients were prescribed pain and inflammation reducing medications, half were prescribed uric acid reducing medications and fourteen percent were on both uric acid reducing and pain/inflammation medications.

Regression Results

Several statistical models that examine the association of different gout treatment medications on gout specific spending were estimated. In addition, the potential offsets that medication use may have on non-drug spending through reductions in hospital admissions, hospital days and the use of ambulatory care services were examined. Also, the impact of gout medication use on personal income and measures of health-related quality of life was examined. The statistical models control for patient demographics (age, gender, race, income, health insurance status, education, health status and number of comorbid chronic conditions).

Gout spending among patients that do not take prescribed medications, medications to reduce pain and inflammation, medications to reduce uric acid, and patients taking medications reduce uric acid and pain and inflammation was examined. The results are presented below.

Average spending to treat a gout episode was approximately \$300. Among patients taking medications to reduce uric acid, total spending declined by \$135, while spending among patients taking both pain reducing and uric acid reducing medications was \$277 higher (Exhibit 5).

There is some evidence that patients prescribed both uric acid reducing, and pain and inflammation medications are less healthy than other gout patients are. For example, 38 percent of patients prescribed both medications report that they are in fair or poor health. In contrast, only 26 percent of gout patients prescribed pain/inflammation reducing and uric acid reducing medications reported they were in fair or poor health. So, the higher costs of gout patients prescribed both medications may simply reflect differences in severity of illness.

The use of gout medications resulted in lower spending on non-drug (total spending less spending on medications) gout expenses (Exhibit 6). Non-drug spending among patients taking medications to reduce pain and inflammation was \$81 lower. Even larger reductions in non-drug spending (\$190) were found for patients taking uric acid reducing medications.

For some comorbid conditions, having gout resulted in increased costs of treatment. For instance, spending to treat hypertension was \$153 higher among gout patients compared to patients without gout. This estimate controls for other factors influencing spending such as age, the number of comorbid conditions, insurance status, and other demographics. Similarly, the costs of treating gout patients with heart disease were over \$2,800 higher per year compared to heart disease patients without gout.

The use of medications to treat gout (compared to patients taking no medications) are also associated with improved health status (Exhibit 7). Our health status measure was the SF-12, which is a widely used measure of a patient's health-related quality of life. These questions include whether the patient has limitations in performing physical activities and the extent to which pain interfered with normal work. The use of uric acid reducing medications resulted in approximately a five percent improvement in the health-related quality of life score (Exhibit 8). At the same time, patients with any physical activity had health-related quality of life scores seven percent higher than gout patients with no physical activity. Physical activity was also associated with an increase of \$2,150 in personal income (Exhibits 9,10).

Gout medications were also associated with a small increase in average hours worked per week (Exhibit 8). Patients taking a uric acid reducing medication worked nearly two hours more per week compared to patients not taking medications.

Discussion

The analysis shows that gout patients taking uric acid reducing medications have lower overall gout spending compared to patients not taking medications. Moreover, substantial offsets in non-drug gout spending associated with both pain and uric acid reducing medications was found. Nondrug gout spending was nearly half the spending for patients on uric acid reducing medications. Nondrug spending was 25 percent lower among gout patients taking pain

reducing medications. These offsets are important to consider since the per capita gout treatment costs are not necessarily a simple examination of the cost of the medication.

There was also slightly improved health-related quality of life among patients taking gout medications and for those with physical activity. There is also some indication that uric acid reducing medications were also associated with additional work hours per week. The rising prevalence of gout, however, should focus attention on effective preventive efforts to reduce the number of patients with gout and arthritis.

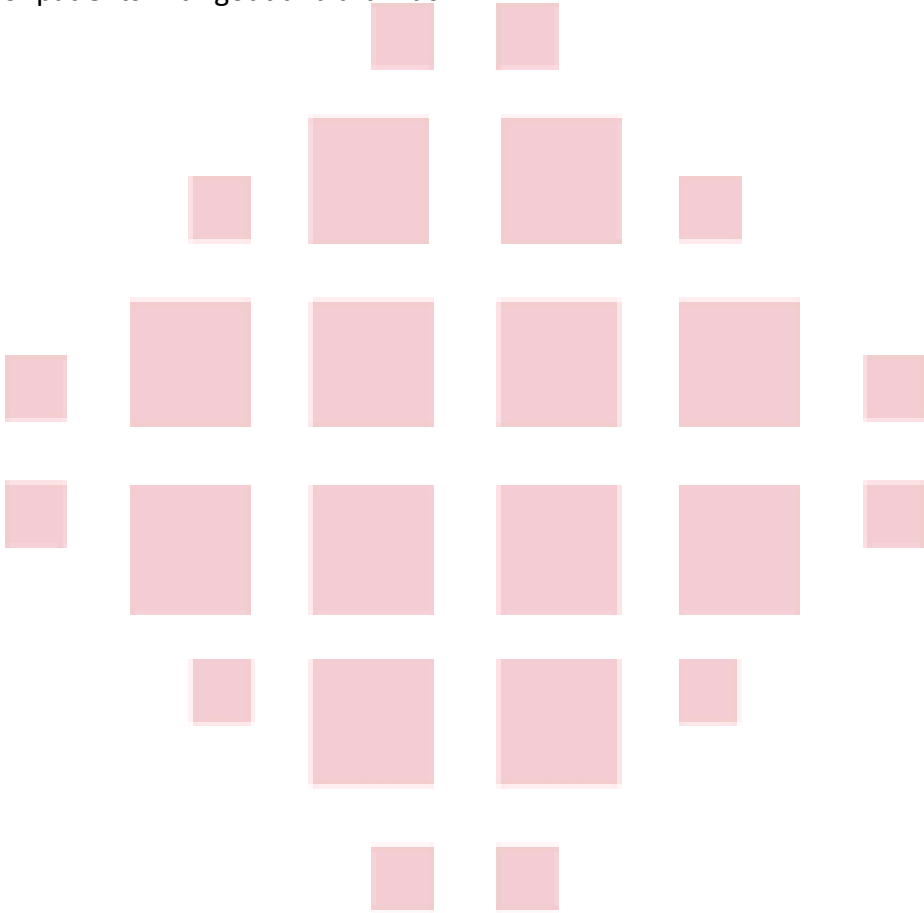


Exhibit 1. Prevalence of Gout by age, gender, race, poverty level, health status, and insurance, MEPS ages 18+

year	N Gout	Prevalence Gout	Age				Gender		Race/ethnicity				Poverty Level (%FPL)				Health Status				Insurance				
			18-35	36-54	55-64	65+	Male	Female	NH White	NH Black	NH Other	Hispanic	<100	100-199	200-399	400+	excellent	very_good	good	fair_poor	uninsured	Medicaid	Medicare	Private	Other_Ins
2000	1,485,542	0.78%	0.04%	0.61%	1.13%	2.44%	1.18%	0.40%	0.00%	0.00%	0.83%	0.36%	0.51%	0.93%	0.98%	0.62%	0.22%	0.67%	1.00%	1.78%	0.30%	0.55%	1.93%	0.74%	0.98%
2001	1,895,795	0.94%	0.10%	0.76%	1.41%	2.71%	1.51%	0.40%	1.67%	0.00%	1.03%	0.20%	1.21%	0.93%	1.02%	0.81%	0.45%	0.74%	1.32%	1.58%	0.43%	0.63%	2.71%	0.86%	0.63%
2002	2,182,941	1.06%	0.13%	0.68%	1.96%	3.12%	1.70%	0.45%	1.20%	1.07%	1.20%	0.14%	0.82%	1.28%	0.85%	1.17%	0.57%	0.66%	1.35%	2.45%	0.64%	0.58%	2.51%	1.03%	0.23%
2003	1,964,696	0.94%	0.09%	0.48%	1.82%	3.03%	1.52%	0.41%	1.06%	1.04%	1.01%	0.13%	0.77%	1.33%	0.67%	1.03%	0.27%	0.68%	1.45%	1.88%	0.35%	0.37%	2.48%	0.93%	1.00%
2004	2,259,369	1.07%	0.12%	0.71%	1.74%	3.28%	1.73%	0.45%	1.12%	1.31%	1.40%	0.43%	1.14%	1.00%	1.03%	1.12%	0.54%	0.80%	1.22%	2.47%	0.53%	0.59%	3.59%	0.91%	1.18%
2005	2,240,049	1.05%	0.12%	0.72%	1.92%	2.94%	1.65%	0.49%	1.08%	1.42%	1.24%	0.51%	1.37%	1.17%	0.93%	1.01%	0.39%	0.69%	1.41%	2.54%	0.71%	0.58%	2.95%	0.94%	0.71%
2006	2,172,077	1.01%	0.13%	0.84%	1.79%	2.47%	1.57%	0.48%	1.04%	1.43%	1.17%	0.42%	0.89%	1.25%	0.99%	0.96%	0.36%	0.68%	1.04%	3.14%	0.33%	0.61%	2.29%	1.04%	1.23%
2007	2,176,898	1.01%	0.07%	0.72%	1.90%	2.67%	1.53%	0.50%	1.12%	1.31%	0.77%	0.31%	0.74%	1.22%	0.91%	1.06%	0.37%	0.76%	1.22%	2.57%	0.42%	0.21%	2.03%	1.09%	0.68%
2008	2,238,525	1.02%	0.14%	0.75%	1.44%	2.91%	1.72%	0.35%	1.21%	1.00%	0.81%	0.19%	0.58%	1.04%	1.14%	1.04%	0.46%	0.60%	1.60%	1.97%	0.38%	0.24%	1.80%	1.16%	0.47%
2009	2,527,332	1.14%	0.06%	0.87%	1.22%	3.73%	1.79%	0.53%	1.25%	1.20%	1.55%	0.36%	0.85%	1.56%	1.02%	1.14%	0.40%	0.74%	1.58%	2.71%	0.44%	0.77%	2.49%	1.16%	0.92%
2010	2,291,183	1.03%	0.10%	0.77%	1.35%	3.00%	1.65%	0.44%	1.09%	1.14%	1.57%	0.37%	0.78%	1.12%	0.84%	1.21%	0.37%	0.84%	1.34%	2.16%	0.40%	0.51%	2.73%	0.96%	0.89%
2011	2,649,148	1.18%	0.15%	0.85%	1.63%	3.26%	1.89%	0.51%	1.35%	1.22%	1.14%	0.38%	0.82%	1.30%	1.16%	1.25%	0.45%	0.95%	1.55%	2.47%	0.31%	0.50%	2.94%	1.19%	0.55%
2012	3,379,193	1.47%	0.13%	0.96%	2.02%	4.30%	2.36%	0.65%	1.67%	1.55%	1.49%	0.53%	0.70%	1.86%	1.26%	1.71%	0.74%	0.99%	1.90%	3.23%	0.43%	0.59%	3.30%	1.53%	1.10%
2013	3,807,809	1.64%	0.12%	1.09%	1.92%	4.97%	2.68%	0.67%	1.85%	1.81%	1.92%	0.45%	1.22%	1.60%	1.79%	1.68%	0.68%	1.16%	2.20%	3.66%	0.60%	1.02%	4.40%	1.51%	0.68%
2014	3,507,067	1.50%	0.12%	1.19%	1.67%	4.17%	2.41%	0.64%	1.74%	1.78%	1.60%	0.18%	1.28%	1.35%	1.50%	1.62%	0.47%	1.24%	1.77%	3.64%	0.54%	1.03%	3.74%	1.37%	0.82%
2015	3,581,851	1.51%	0.06%	0.91%	2.19%	4.28%	2.23%	0.84%	1.76%	1.83%	1.38%	0.30%	1.24%	1.72%	1.54%	1.49%	0.49%	1.21%	1.92%	3.54%	0.48%	1.07%	4.47%	1.22%	0.87%
Total		1.16%	0.11%	0.81%	1.71%	3.40%	1.84%	0.52%	1.33%	1.38%	1.08%	0.33%	0.94%	1.31%	1.11%	1.20%	0.46%	0.85%	1.51%	2.64%	0.46%	0.66%	2.99%	1.10%	0.81%

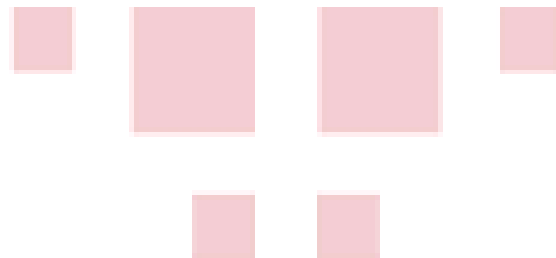


Exhibit 2: Prevalence of Top 5 Comorbid Conditions for Gout Patients

Year	High BP	Lipids	Arthritis	Heart Disease	Diabetes
2000	44.42%	20.09%	33.36%	29.21%	18.05%
2001	60.16%	20.86%	25.06%	23.11%	14.70%
2002	59.00%	22.64%	27.85%	28.10%	21.86%
2003	63.07%	25.81%	26.18%	31.35%	18.58%
2004	60.16%	30.67%	29.79%	27.24%	24.71%
2005	61.80%	36.77%	23.59%	31.02%	28.76%
2006	56.88%	39.16%	26.27%	33.38%	25.08%
2007	59.99%	46.53%	31.27%	30.53%	34.11%
2008	69.30%	54.64%	41.29%	30.98%	33.83%
2009	71.71%	62.23%	44.51%	32.22%	30.44%
2010	75.98%	58.56%	33.81%	36.73%	28.33%
2011	72.45%	62.37%	40.45%	32.91%	25.37%
2012	76.62%	61.22%	45.30%	27.43%	31.42%
2013	80.86%	51.00%	46.68%	28.03%	37.27%
2014	82.66%	59.78%	43.87%	31.04%	35.88%
2015	76.90%	60.27%	41.29%	37.26%	33.60%
Total	69.27%	47.40%	36.59%	30.82%	28.91%

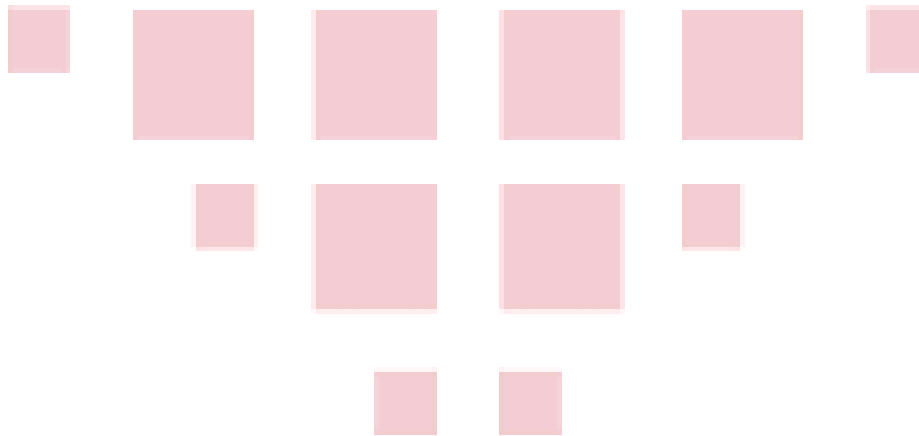


Exhibit 3. Gout specific spending and total health spending for gout patients

year	Gout Exp	Mean Gout Exp	Total Exp	Mean Total Exp
2000	\$680,458,297	\$458	\$10,953,859,956	\$7,374
2001	\$652,144,127	\$344	\$13,416,064,505	\$7,077
2002	\$728,823,228	\$334	\$21,265,955,908	\$9,742
2003	\$986,764,608	\$502	\$16,344,210,550	\$8,319
2004	\$776,396,342	\$344	\$22,322,493,922	\$9,880
2005	\$816,755,354	\$365	\$32,982,308,845	\$14,724
2006	\$1,244,669,167	\$573	\$24,800,117,281	\$11,418
2007	\$699,181,253	\$321	\$33,054,525,513	\$15,184
2008	\$583,239,618	\$261	\$25,217,770,700	\$11,265
2009	\$1,097,785,710	\$434	\$26,538,986,367	\$10,501
2010	\$758,971,746	\$331	\$25,628,599,546	\$11,186
2011	\$930,634,155	\$351	\$41,598,895,289	\$15,703
2012	\$1,336,402,738	\$395	\$31,382,938,183	\$9,287
2013	\$2,355,549,816	\$619	\$39,039,498,487	\$10,252
2014	\$1,645,097,027	\$469	\$45,758,464,785	\$13,048
2015	\$1,776,636,607	\$496	\$53,017,912,315	\$14,802
Total	\$17,069,509,791	\$423	\$463,322,602,152	\$11,480

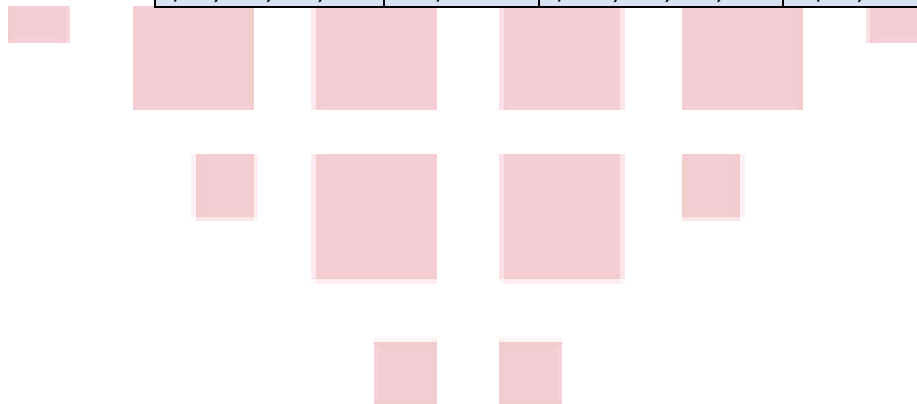


Exhibit 4. Number of Comorbid Conditions Among Gout Patients

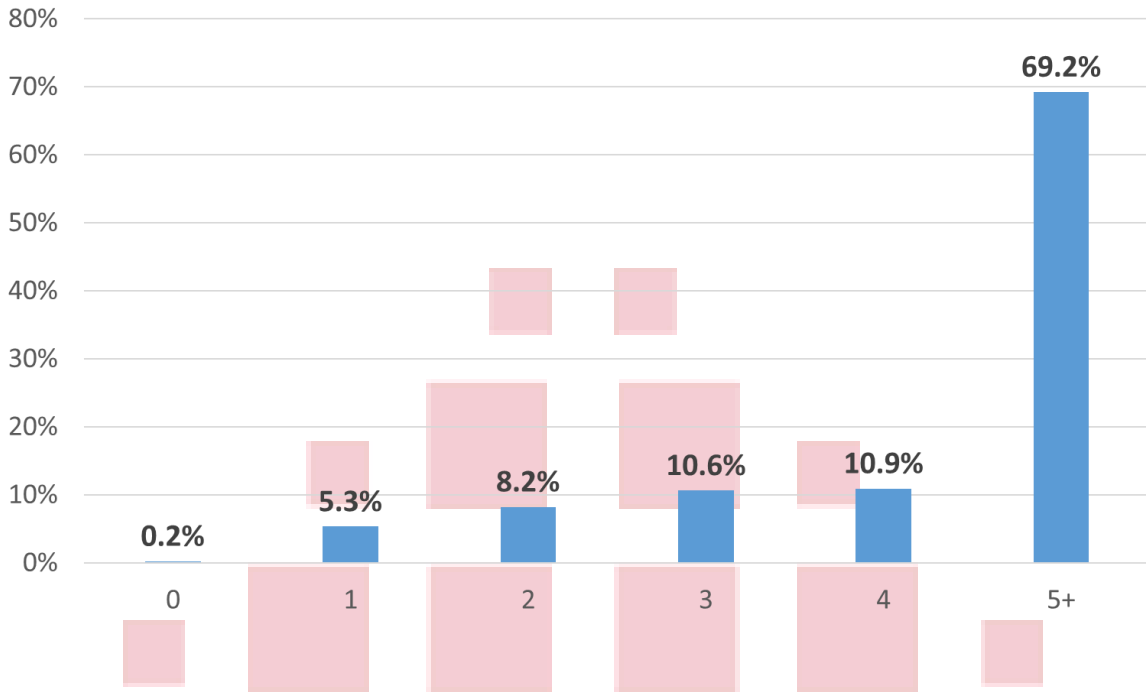
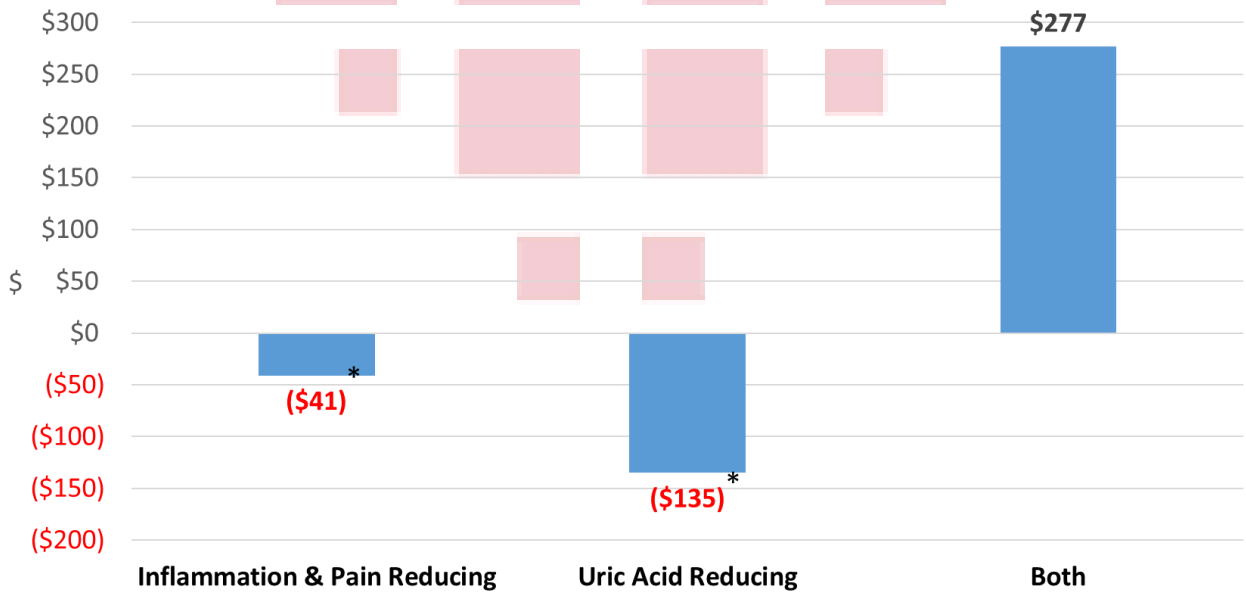


Exhibit 5. Impact of Gout Medications on Gout – Specific Spending



* Not Statistically Significant

Exhibit 6. Impact of Gout Medications on Non-Drug Gout Spending

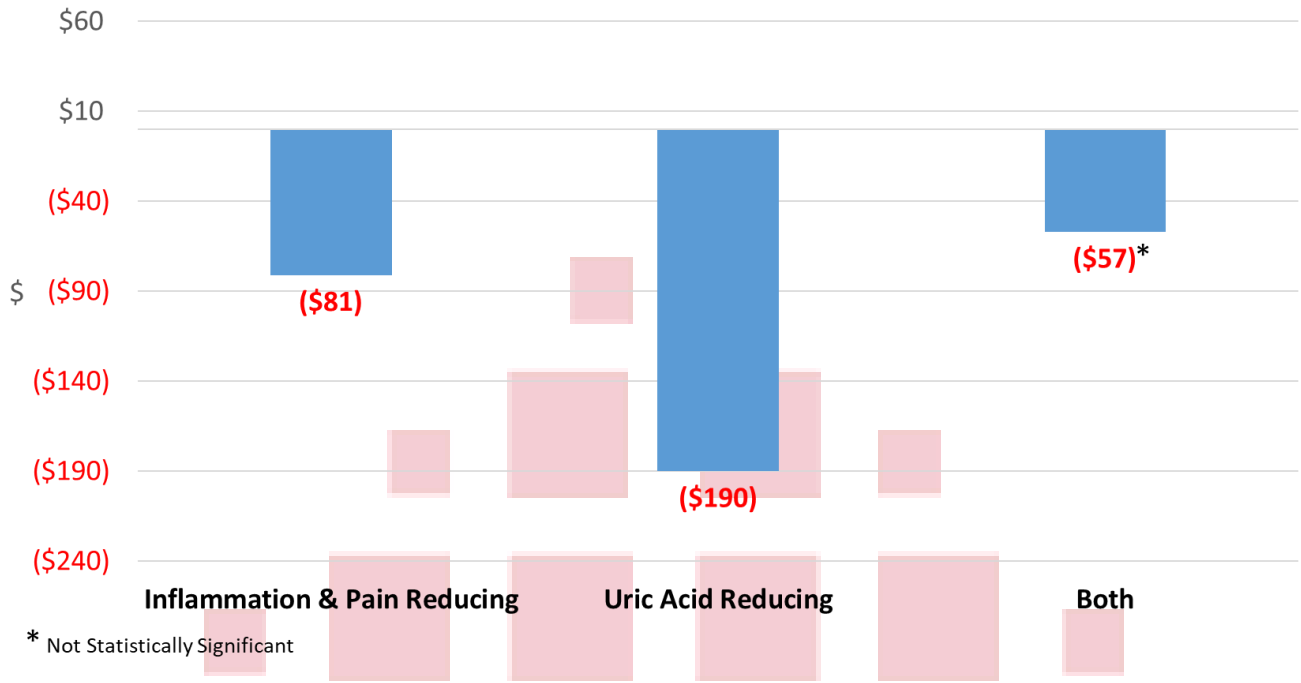


Exhibit 7. Impact of Gout Medications on Physical Health Status

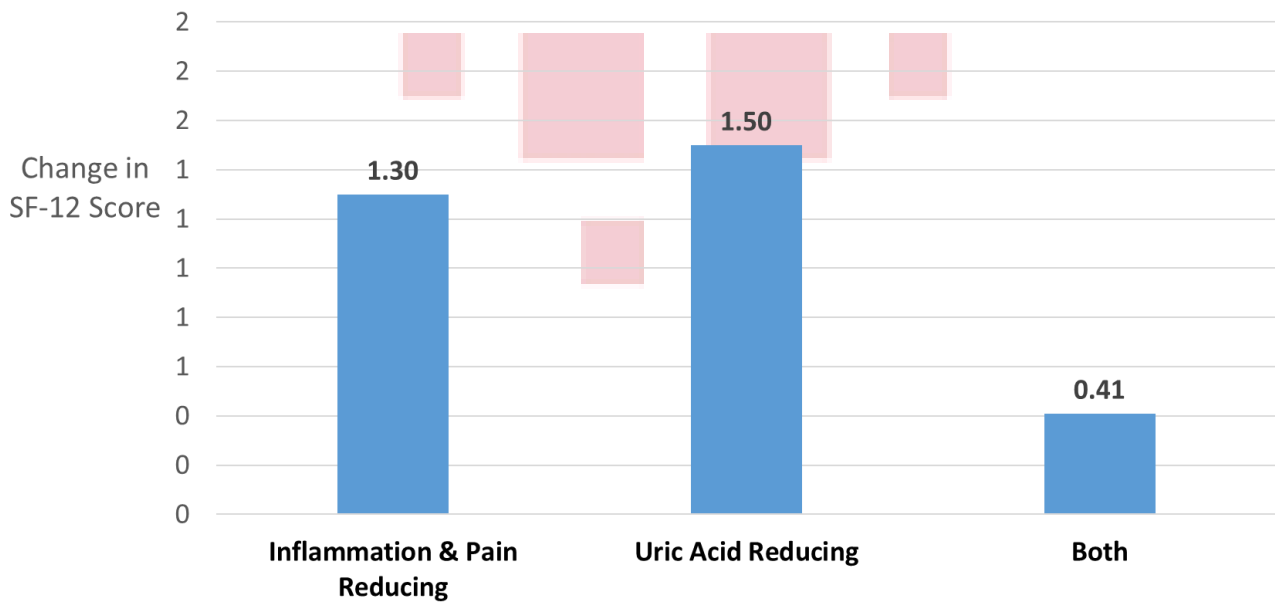
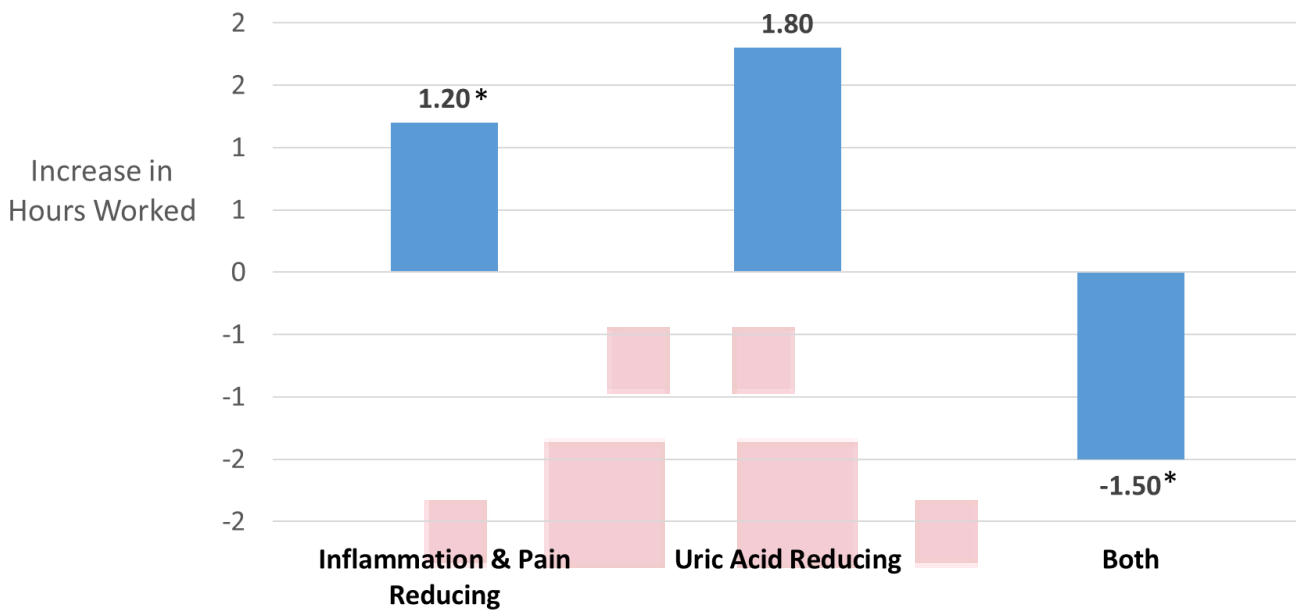


Exhibit 8. Impact of Gout Medications on Weekly Hours Worked



* Not Statistically Significant

Exhibit 9. Impact of Physical Activity and Exercise on Personal Income among Gout Patients

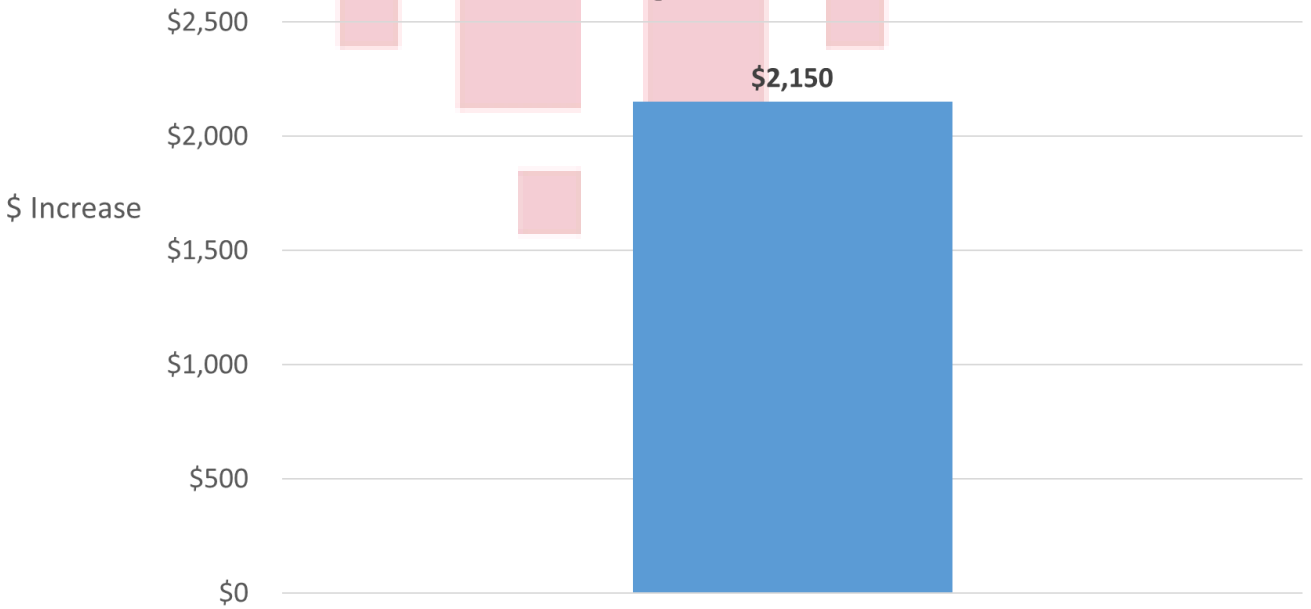


Exhibit 10. Impact of Physical Activity and Exercise on Physical Health Status among Gout Patients

